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Rubber Research Scheme (Ceylon).

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DARTONFIELD ESTATE—VISITORS' DAYS

The *second* and *fourth* Wednesdays in each month have been set aside as Visitors' Days at Dartonfield Estate, and the services of technical officers will be available to visitors on those days. The estate superintendent will be available every Wednesday. Visitors are requested to arrive on the estate not later than 9.30 a.m.

While visitors will be welcomed at the Station on other days, any particular member of the staff may not be free to give them attention unless an appointment has been made.

Dartonfield Estate is situated about 3½ miles from the main Matugama-Agalawatta Road, the turn-off being near culvert No. 14/10. The distance from Colombo is approximately 47 miles.

PUBLICATIONS

Rubber Research Scheme publications comprising Annual Reports, Quarterly Circulars and occasional Bulletins and Advisory Circulars are available without charge to the Proprietors (resident in Ceylon), Superintendents and Local Agents of Rubber estates in Ceylon over 10 acres in extent. Forms of application for registration may be obtained from the Director. Extra copies of publications can be supplied to the Superintendents of large estates for the use of their assistants.

ADVISORY CIRCULARS

The former issue of cyclo-styled Planting Memoranda have been replaced by printed Advisory Circulars. The undernoted Circulars may be obtained on application at 25 cents per copy. Future issues in the series will be sent free of charge to estates registered for the receipt of our publications :—

(1) Notes on budgrafting procedure.

(2) Programme of manuring for replanted rubber clearings (May, 1940).

(3) Notes on rubber seedling nurseries (November, 1939).
(4) Contour lining, holing and filling, cutting of platforms, trenches and drains (June, 1939).
(5) Straining box for latex (January, 1940).
(6) Notes on the care of budded trees of clone Tjirandji 1 with special reference to wind damage (September, 1938).
(7) Notes on procedure and equipment at Dartonfield Estate factory (May, 1940).
(8) Planting and after-care of budded stumps (January, 1940).
(9) The preparation of latex for shipment (May, 1940).
(10) Root disease in replanted areas (August, 1939).
(11) Emergency rubber coagulants (May, 1940).
(12) Warm air drying house for crepe rubber (May, 1940).
(13) Notes on the preparation of clean rubber (May, 1940).
(14) Rat Control (September, 1940).

FIELD EXPERIMENTS ON DARTONFIELD ESTATE—XIII

MEASUREMENTS OF GROWTH IN REPLANTED AREAS, 1940

L. A. WHELAN, *Soil Chemist*

and

C. A. de SILVA, *Assistant Botanist*

[This paper is the fourth in a series dealing with growth measurements in experimental areas on Dartonfield. Measurements taken in 1937, 1938 and 1939 will be found in the *Quarterly Circulars* Vol. 14, 1937, Parts 3 and 4; Vol. 15, 1938, Part 3; and Vol. 16, 1939, Parts 3 and 4. Details of the scope and design of the experiments will be be found in

Vol. 11, 1934, Parts 3 and 4

Vol. 13, 1936, Parts 2 and 4.]

NO. 1 REPLANTING EXPERIMENT, 1934 CLEARING, 7½ ACRES

FOR purposes of the experiment this area is divided into 3 monoclonal blocks planted respectively with clones Glenshiel 1, A.V.R.O.S. 256, and Prang Besar 25. Each block is divided into 4 strips running from top to the bottom of the hillside planted, respectively, with the following ground covers :—

1. *Centrosema pubescens*
2. *Pueraria phaseoloides*
3. *Calopogonium mucunoides*
4. *Dolichos hosei* (Vigna).

At right angles to these strips each block is divided into 3 plots with the following methods of dealing with the old Rubber timber :—

A. Leaving all main stems lying unburned.

B. Burning all timber on the land.

C. As B, but removing and burning all larger lateral roots.

The "plaid shawl" arrangement arising from these strips and plots at right angles to one another, results in unit plots of 16 trees, and each plot is divided into 2 sub-plots with different methods of controlling the ground cover as under :—

X. Keeping individual platforms (15 feet long) clean weeded.

Y. Ring weeding in 6 feet diameter circle round each tree.

This field was planted with budded stumps in June, 1934, and the stocks were cut back in September, 1934. The age of the trees is calculated from the latter month, so that at the time of taking the last series of measurements in September, 1940, the trees were six years old.

The field will be taken into tapping early in 1941, the material being utilised for a comparison of tapping systems. This involves the discontinuance of the original experimental treatments and the present is therefore an opportune time to summarise the results and conclusions. The average girth and yearly increment figures for 5 consecutive years are presented in Tables I and II respectively. Treatment differences which are significant by the conventional standard of a 20:1 chance are indicated in the tables.

Species of Cover.—The annual increments in girth for the years 1936-40 under the four species of ground cover are illustrated graphically in Fig. 1. This shows that up to the third year the thicker and more vigorous covers, Pueraria and Centrosema, exercised a greater retarding effect on the growth of the Rubber trees than the lighter covers, Calopogonium and Vigna. Thereafter the opposite tendency is to be noted, until in 1939-40 the growth was slightly superior in the former plots. This suggests that the benefits to the soil consequent on the luxuriant growth of a heavy cover are now more than counterbalancing the effect of root competition.

The graph is also of interest as illustrating the relationship between rate of growth and age. It is seen that a peak is reached in the fourth year when the average increase in girth attained the satisfactory figure of 4.68 inches.

Turning to the general suitability of the various species of cover, the outstanding development during the past year has been the gradual disappearance of Calopogonium and Vigna under the

increasing shade. In some areas, indeed, the cover has become so thin as to afford little protection against soil erosion, and it has been necessary to replant with Centrosema or Pueraria. Both these latter covers have been well maintained, but there are indications that Centrosema may prove to be the more permanent of the two.

Our standard recommendation to plant a mixture of Calopogonium and Centrosema in new clearings would seem to strike a satisfactory compromise between the advantages and disadvantages of the different species. Calopogonium covers the ground rapidly in the first year and is gradually replaced by the more permanent Centrosema. No objection, however, is offered to the use of other species such as Vigna, Pueraria or *Desmodium ovalifolium* if they are already present or if local conditions indicate that they will be specially suitable.

Control of Cover.—In considering the results in Tables I and II for the two methods of controlling the cover in the X and Y plots, it is necessary to state that the cover has been taken back from the platform in the Y plots twice a year at the times of manuring. At one six monthly application the cover has been mulched on the surface, while at the other it has been forked into the platforms. Although there is a slight tendency for trees which are ring weeded to gain on those planted on clean weeded platforms, the differences in the growth of Rubber under the two methods of control are not significant. It is evident that, under the conditions of the experiment, it is unnecessary to clear away the cover further than 3 feet from the plant, but general observations elsewhere show that this does not apply in areas where a strong cover, *e.g.*, Pueraria, was already in existence before the Rubber stumps or seedlings were planted.

Timber Treatments.—The effects of the timber treatments remain inconclusive throughout. For the want of adequate replication the experimental error is high and the indications of poorer growth, where the laterals have been removed, do not receive the necessary statistical support for confirmation. No fresh cases of root disease were reported from this area in 1940. Four cases of *Fomes lignosus* and one of *Poria hypobrunnea* occurred up to the end of 1939; all in areas where the lateral roots were left in the ground. This suggests that the incidence of root disease can be materially reduced by preliminary removal of the larger lateral roots.

TABLE I

BUDDED STUMPS PLANTED IN JUNE, 1934.

GIRTH IN INCHES AT 3 FEET FROM UNION.

Treatments	Year	1936	1937	1938	1939	1940
	Age	2 yrs.	3 yrs.	4 yrs.	5 yrs.	6 yrs.
Species of Cover						
1. *Centrosema pubescens*		5·16	8·93	13·40	17·29	20·92
2. *Pueraria phaseoloides*		4·95	8·61	13·56	17·86	21·41
3. *Calopogonium mucunoides*		5·51	9.36	13·83	17·69	21·16
4. *Dolichos Hosei* (Vigna)		5·43	9·66	14·49	18·48	21·90
Mean		5·26	9·14	13·82	17·83	21·35
Standard error		—	0·19	0·18	—	
Significant Difference (P = ·05)		Not significant	0·64	0·61	Not significant	Not significant
Timber Treatments						
A. Leaving all main stems lying unburned.		5·38	9·38	14·06	18·08	21·68
B. Burning all timber on the land.		5·19	9·16	13·94	17·99	21·40
C. As B, but also removing and burning all larger lateral roots.		5·22	8·88	13·46	17·42	20·97
Mean		5·26	9·14	13·82	17·83	21·35
Differences		Not significant				
Control of Cover						
X. Keeping platforms clean weeded.		5·30	9·17	13·76	17·64	21·23
Y. Ring weeding in 6 feet diameter circle		5·22	9·10	13·88	18·01	21·46
Mean		5·26	9·14	13·82	17·83	21·35
Differences		Not significant				

TABLE II

MEAN INCREASE IN GIRTH IN INCHES AT 3 FT. FROM THE UNION.

Treatments	Year	1936—37	1937—38	1938—39	1939—40	Mean yearly increase
	Age	2—3 yrs.	3—4 yrs.	4—5 yrs.	5—6 yrs.	
Species of Cover						
1. *Centrosema pubescens*		3·77	4·47	3·89	3·63	3·94
2. *Pueraria phaseoloides*		3·66	4·95	4·30	3·55	4·12
3. *Calopogonium mucunoides*		3·85	4·47	3·86	3·47	3·91
4. *Dolichos Hosei* (Vigna)		4·23	4·83	3.99	3·42	4·12
Mean		3·88	4·68	4·01	3·52	4·02
Standard error		0·56	—	0·087	—	—
Significant difference (P = ·05)		0·20	Not significant	0·30	Not significant	—
Timber Treatments						
A. Leaving all main stems lying unburned.		4·00	4·68	4·02	3·60	4·08
B. Burning all timber on the land		3·97	4·78	4·05	3·41	4·05
C. As B, but also removing and burning all larger lateral roots		3·66	4·58	3·96	3·55	3·94
Mean		3·88	4·68	4·01	3·52	4·02
Differences		Not significant				
Control of Cover						
X. Keeping platforms clean weeded.		3·87	4·59	3·88	3·59	3·98
Y. Ring weeding in 6 feet diameter circle.		3·88	4·78	4·13	3·45	4·06
Mean		3·88	4·68	4·01	3·52	4·02
Differences		Not significant				

The mean girth measurements for the three clones are given in Table III for 5 consecutive years. As the whole area is divided into three monoclonal blocks, a strict comparison between the growth of clones is not statistically valid, but it is satisfactory to note that Clone Glenshiel 1 shows a fair rate of growth in a block which falls into a less favoured section of this field.

TABLE III

	1936	1937	1938	1939	1940
Glenshiel 1 ...	5·09	8.54	13.04	16.94	19.93
A.V.R.O.S. 256 ...	5.63	10.00	14.57	18.30	21.84
Prang Besar 25 ...	5.05	8.88	13.85	18.25	22.27
Mean ...	5.26	9.14	13.82	17.83	21.35

The histogram for 1940 reproduced as Fig. II represents the frequency distribution, according to girth, of all the trees in this area excluding supplies. At six years old, 84 per cent of the trees have reached a girth of 18 inches and over, and 96 per cent a girth of 16 inches and over. On the basis of the latter it is hoped that not more than 5 per cent of the trees will be excluded from the tapping experiment, which will be started after the wintering period in 1941.

NO. 2 REPLANTING EXPERIMENT, 1938, 19½ ACRES

This experiment contains 6 blocks or replications and each block is divided into 9 randomised plots for a comparison of the manurial treatments N, P, K, NP, NK, PK, NPK, Compost and Control. Five blocks were replanted with budded stumps in May-June, 1938 and one in the following November.

The manures applied per plant in the NPK (or "complete manure") plots up to the last series of measurements are shown in Table IV.

TABLE IV

MANURES APPLIED PER PLANT

	Sulphate of Ammonia	Saphos Phosphate	Muriate of Potash	Equivalent Compost
May, 1938	5.2 oz.	3.3 oz.	1.9 oz.	10 lb. 0 oz.
March, 1939	2.4 ,,	1.7 ,,	1.0 ,,	4 ,, 3 ,,
Sept., 1939	4.8 ,,	3.3 ,,	1.9 ,,	10 ,, 0 ,,
March, 1940	4.8 ,,	3.3 ,,	1.9 ,,	14 ,, 9 ,,
	17.2 ,,	11.6 ,,	6.7 ,,	38 ,, 12 ,,

FIG 1.

ANNUAL GIRTH INCREMENTS IN INCHES

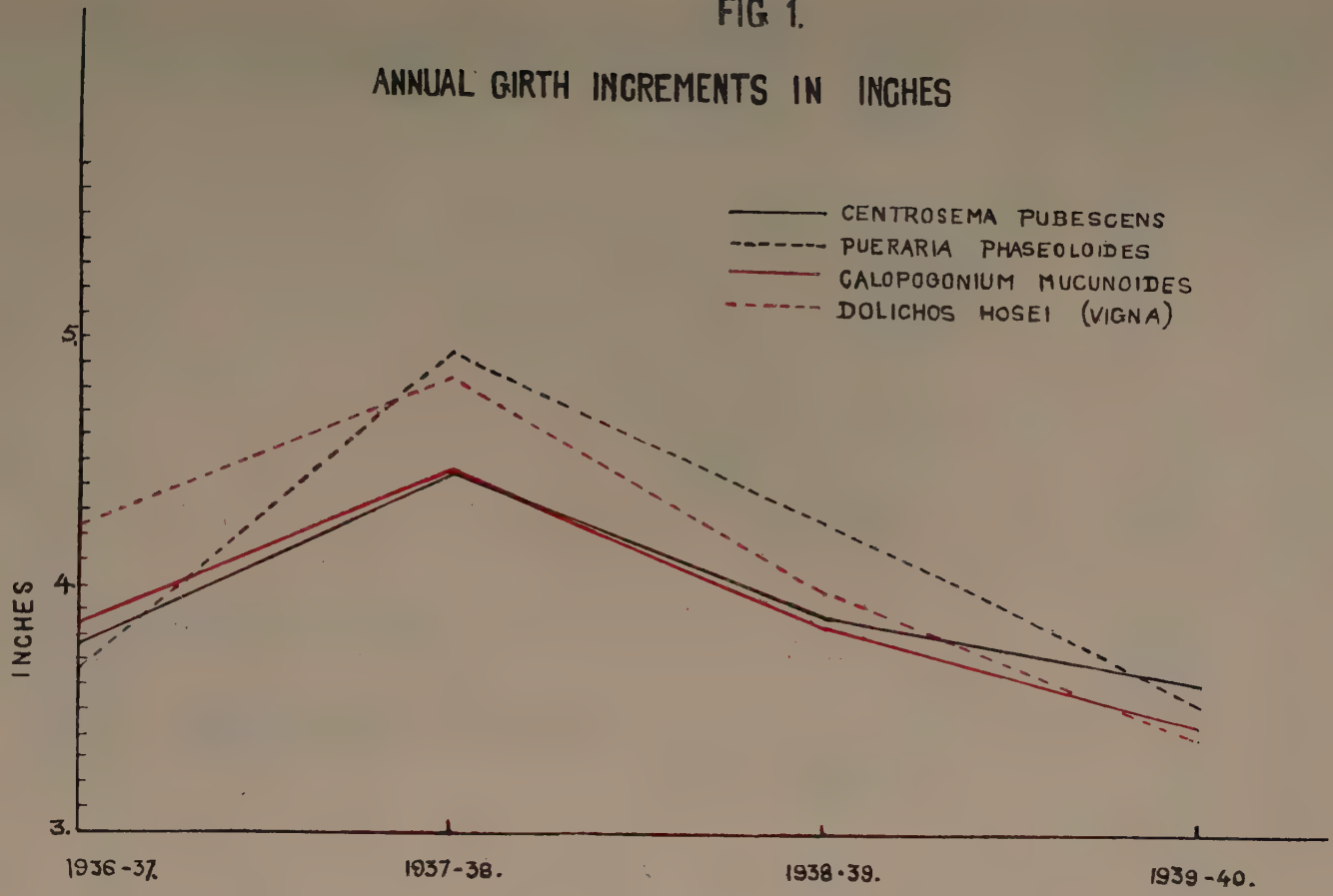
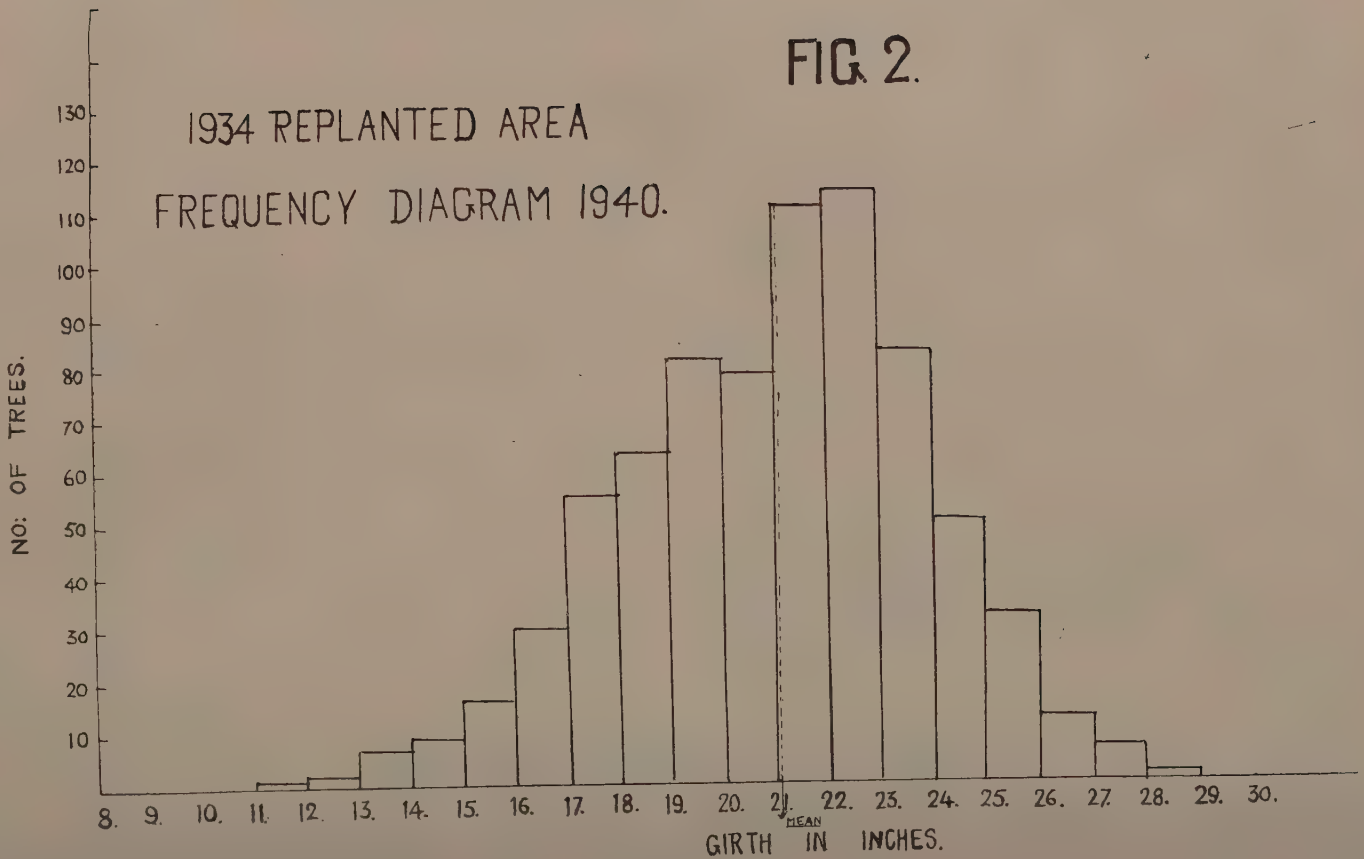


FIG. 2.


1934 REPLANTED AREA
FREQUENCY DIAGRAM 1940.
NO: OF TREES.
130
120
110
100
90
80
70
60
50
40
30
20
10
8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30.
MEAN
GIRTH IN INCHES.

The amounts of artificial manures applied to the other treatment plots were made up from the above quantities.

Manures in 1938 were added to the planting hole and in 1939 and 1940 were applied in a circle round the plant.

Girth measurements were made in June, 1940. A summary of the June measurements and of the increments for the 9 month period September 1939 — June 1940 is given in Table V.

TABLE V

MEAN GIRTH IN INCHES PER PLANT.

Treatment	Mean of 5 blocks			Mean of 6 blocks June, 1940
	Sept. 1939*	June, 1940	Increment for 9 months**	
O	2·90	4·66	1·76	4·45
N	2·97	4·42	1·45	4·14
P	3·06	4·66	1·60	4·41
K	2·95	4·70	1·75	4·47
NP	2·80	4·70	1·90	4·47
NK	3·18	4·83	1·65	4·55
PK	3·14	5·04	1·90	4·64
NPK	3·34	5·21	1·87	4·80
Compost	3·37	5·13	1·76	4·68

The results to date point to no significant girth differences among the nine manurial treatments although the "complete" manure appears to have given the best result.

A comparison of the increment figure from all plots receiving phosphate with that from plots not receiving phosphate shows a significant response to that nutrient of .17 in. or 10 per cent. A smaller but non-significant response is shown for potash.

* The September, 1939 measurements given in Vol. 16, Parts 3 and 4 page 105 were slightly too low owing to an error in calculation. The correct values are given in the present paper.

** To obtain the increment values in column 4, only 5 replications were used, as the plants in one block were too small owing to late planting for the September girth measurements.

Increment values obtained over such a short period as 9 months may have little practical importance, but, taken in conjunction with the actual 1940 girth figures they support the R.R.S. general recommendation of an NPK mixture (with K as the minor constituent) for young Rubber.

In this experiment a differential treatment of the green cover is being carried out. Loppings are envelope-forked in one series of sub-plots and spread over the manured area in the other series. In June the girth measurements for the two series were :—

Forking	...	4.48 ins.
Mulching	...	4.57 „

The results to date show no difference between the two methods of application.

NO. 3 REPLANTING EXPERIMENT, 1936, 9½ ACRES.

In this experiment the following treatments are compared :—

Methods of Opening	Methods of Planting	Manuring
1. Platforms	1. Budded Stumps	1 Organic
2. Trenches	2. Stumped Buddings	2. Inorganic (of equivalent NPK content.)
3. Pitted Drains	3 Seed at stake budded in the field.	

The manures applied per plant in 1940 were :—

Organic			Inorganic		
	Budded stumps and stumped buddings	Field buddings		Budded stumps and stumped buddings	Field buddings
Groundnut Cake	36 oz.	20 oz.	Sulphate of Ammonia	27 oz.	17 oz.
Blood Meal	23 „	14 „	Saphos Phosphate	13 „	12 „
Bone Meal	18 „	16 „	Muriate of Potash	5 „	3 „
Muriate of Potash	5 „	3 „		45 „	32 „
	82 „	53 „			

The field buddings received a smaller quantity of manure than plants budded in the nursery. This is in accord with the principles laid down in the R.R.S. schedule of manuring where it is recommended to give field buddings the same amount of manure as that given to budded stumps at a similar stage of growth.

In June 1940 girth measurements were made of all plants in the area and a summary is given in Table VI.

TABLE VI

MEAN GIRTH PER PLANT IN INCHES

	1939	1940	Increment 1939-1940
Methods of Opening			
1. Platforms	8.99	12.46	3.47
2. Trenches	8.87	12.17	3.30
3. Pitted Drains	8.07	11.39	3.32
Standard Error	.198		
Significant Difference (.05)	.69	Not Significant	
Methods of Planting			
1. Budded Stumps	9.19	12.77	3.58
2. Stumped Buddings	11.84	15.33	3.49
3. Field Buddings	4.89	7.91	3.02
Standard Error	.266	.273	.165
Significant Difference (.05)	.79	.81	.49
Manuring			
1. Organic	8.64	11.89	3.25
2. Inorganic	8.65	12.12	3.47
Standard Error		Not	.058
Significant Difference (.05)		significant	.23 (P=.01)

Methods of Opening

The growth on the platforms and in the trenches is practically the same, but in both the 1939 and 1940 measurements there is evidence of considerable difference between growth on these two areas and that in the pitted drains, although in 1940 the difference is not statistically significant.

The increments for the year show only small differences among the three methods, and there is no evidence of any decrease in the early advantage obtained by the trench and platforms systems over the pitted drain system.

The apparent differences among the methods of opening discussed above, may be investigated a little more fully.

The experiment covers an area of irregular shape, part of which is a steep slope possessing a fair depth of soil towards the bottom but shallow and gravelly near the top. To map out 4 large blocks each fairly uniform within itself is a matter of some difficulty. This was done fairly satisfactorily for three of the replications but the area remaining for the fourth block was a strip running from top to bottom of the slope.

On randomisation of the three opening treatments in this block the platform system was put down at the base of the strip and the remaining two systems on the steeper part of the slope.

From the aspect of soil fertility and possibly that of wind protection it appears that the platform system has been favoured at the expense of the other two.

Examination of the results for this block shows that growth has been best on the platform area, but in view of the circumstances it may be unwise to ascribe this to superiority of the platform over the other systems of opening.

A re-examination of the girth figures, bearing the above facts in mind, is worth consideration.

The disturbing effect of soil variation in Block I may be avoided by calculating the means on three blocks only. The omission of a replication from a series is not in general a sound procedure, but in this instance there appears to be some justification.

The mean girths in inches per plant, calculated on three blocks only, are: platforms 12.33 inches, trenches 12.32 inches and drains 11.48 inches. (Differences between methods are not statistically significant).

The figures for platforms and trenches are now the same and the difference between platforms and drains has narrowed considerably. The general effect has been to bring the results for the three systems more into line.

In view of the above, and that the apparent large difference between platforms and trenches on the one hand and drains on the other are not statistically significant it is suggested that at this stage there is no sound evidence that growth is better on the platforms and trenches.

Methods of Planting

The girth of budded stumps is significantly greater than that of plants budded in the field and the girth of stumped buddings is significantly greater than that of budded stumps.

The increments for the year show very little difference between budded stumps and stumped buddings. Budded stumps are significantly greater than plants budded in the field. A similar

advantage appears with respect to stumped buddings over field buddings, but this is not quite significant. There is no indication of plants budded in the field catching up on those budded in the nursery and transplanted.

Manuring

The results with inorganic appear to be slightly better than those with organic but this difference of .23 in. or 2 per cent increase over the organic is not significant.

The increments for the period show that the inorganic is the greater by .22 in. or 7 per cent increase over the organic. This increase, though small, is statistically significant ($P = .05$) and falls just short of the more stringent test ($P = .01$).

In June, 1939 both series had approximately the same girth but in the succeeding 12 months the response to the inorganic mixture has been slightly greater than that to the organic. It may be that whilst the earlier applications of manure were in excess of the actual needs of the small plants, resulting in equal response to both types, the plants are now well enough developed to assimilate the quantities of plant food added and these are more available in the inorganic than in the organic mixture.

The above results are of interest, but the small difference in favour of the inorganic mixture is of itself of little practical importance. What is of importance is the evidence that under the conditions of this experiment the more expensive organic mixture has to date shown no better results than the inorganic.

Summary.

(i). Replanting experiments are briefly described and the results are summarised.

(ii). Up to the third year of growth Pueraria and Centrosema exercised a greater retarding effect on the Rubber trees than Calopogonium and Vigna. Thereafter, the opposite tendency was noted.

(iii). A gradual disappearance of Calopogonium and Vigna under increasing shade is evident in the sixth year, and there are indications that Centrosema may be more permanent than Pueraria.

(iv). There is evidence that, under the conditions of the experiment, it is unnecessary to clear away the cover more than three feet from the plant.

(v). Differences in growth corresponding to the three timber treatments remain inconclusive throughout the experiment, but indications of poorer growth are evident in areas where lateral roots were removed.

(vi). At six years old 84 per cent of the trees have reached a girth of 18 inches and over and 96 per cent a girth of 16 inches and over

(vii). The response of two year old budded stumps to manure has been disappointing but there is some evidence that an NPK mixture has given the best results.

(viii). No difference in girth has resulted from a comparison of two methods of applying green loppings ; forking, and surface application.

(ix). There is some evidence that growth in pitted drain areas is inferior to that in the platform and trench areas but the evidence is such that a definite preference cannot be given to any one system.

(x). There is no indication that plants budded in the field are catching up on those budded in the nursery and transplanted as either budded stumps or stumped buddings.

(xi). Growth increment in the fourth year is slightly but significantly better with an inorganic than with an organic manure mixture.

MANURING UNDER WAR CONDITIONS

L. A. WHELAN, *Soil Chemist*

AS a result of the War in Europe there has been a general rise in the cost of chemical manures, some fertilisers are not obtainable in the Island and future supplies of others are uncertain.

The uncertainty of the fertiliser position renders difficult the planning of a manuring programme for any time ahead and this limitation should be borne in mind when reading the following notes.

Fertiliser Stocks

The following notes are based on information supplied by the Fertiliser Firms, to whom acknowledgment is made.

Sulphate of Ammonia.	Not available for mature Rubber but may be supplied for young Rubber and for nurseries.
Calcium Cyanamide.	Not available. No replacements likely.
Nitrate of Soda Groundnut Cake	Stocks available. No shortage anticipated.
Niciphos	Not available.
Saphos Phosphate	Stocks available. Further shipments expected.
Bone Meal	Stocks available Future uncertain.
Basic Slag Superphosphate	Not available.
Muriate of Potash	Stocks available, but rationed with respect to Rubber over 7 years old.
Nitrate of Potash	Stocks low. Present high price does not encourage further purchases,

Valuation of Manures

A mere statement of the weight of manure applied conveys very little information with regard to its value as a plant food. The true value of a manure depends mainly on the amount of nutrient it contains and to a lesser extent on the form in which the nutrient is present.

In a comparison of manures containing the same plant food the cost should be calculated on a unit basis, and this is conveniently taken as the cost of 22.4 lbs. of the particular *nutrient* and not of the manure. The importance of understanding the composition of the fertiliser will best be seen from an example.

The simple statement that "100 lbs. nitrogenous manure have been applied" could refer to any of the following :—

100 lbs. Sulphate of Ammonia at Rs. 209 per ton contains 20.6 per cent nitrogen. Cost per unit of nitrogen = Rs. 10.15.*

100 lbs. Nitrate of Soda at Rs. 207 per ton contains 16 per cent nitrogen. Cost per unit of nitrogen = Rs. 12.94.

100 lbs. Groundnut Cake at Rs. 90 per ton contains 7 per cent nitrogen. Cost per unit of nitrogen = Rs. 12.86.

100 lbs. Coconut Poonac at Rs. 35 per ton contains 3 per cent nitrogen. Cost per unit of nitrogen after allowing for the small amount of phosphate and potash present = Rs. 8 (approx.)

[The quotations for the first three manures mentioned were received on 4th January, 1941, but the possibility of an early rise should be borne in mind. The figure for Poonac refers to an earlier quotation.]

In purchasing manures attention should be paid to :—

1. Price per unit of nutrient.
2. Suitability for the particular purpose.
3. Bulk in so far as it concerns transport cost and necessity for forking.

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* Cost per unit of nitrogen $= \frac{\text{Cost of manure per ton}}{\text{Percentage of nitrogen in manure}}$

$= \frac{209}{20.6} = \text{Rs. } 10.15$

Wartime Modifications Suggested in R.R.S. Manuring Programmes

Nursery Plants.

In place of the Niciphos-Potash mixture formerly advised (see *Advisory Circular No. 3),* the following substitute may be used):—

Sulphate of Ammonia	8 parts
Saphos phosphate	5 „
Muriate of Potash	2 „

14 parts of the substitute may be used in place of 10 parts of the former standard mixture. If the substitute mixture is not obtainable it is suggested that Animal Meal or similar manure be used.

Immature Rubber.

The following mixtures are suggested as alternatives to those in *Advisory Circular No. 2 :—*

Substitutes for Young Rubber Mixture

	B and C	D
Nitrate of Soda	5½ parts	6 parts
Groundnut Cake	3 „	3½ „
Saphos Phosphate	2½ „	3 „
Bone Meal	1 part	— „
Muriate of Potash	1 „	1 part
	13 parts	13½ parts

4 lbs. of the substitutes correspond approximately in nutrient value to 3 lbs. of mixtures B, C or D.

Nitrate of soda is a soluble manure, and as a safeguard against excessive loss of nitrogen by leaching, part of the nitrogen in the mixture is supplied by the organic manure, Groundnut Cake.

The mixtures should be forked or dibbled in round the young plants, preferably at a time when heavy rain is not expected.

As a further safeguard against possible loss, the dose may be split and half quantities given at shorter intervals.

Mature Rubber.

The general manuring programme normally recommended for mature Rubber is a biennial application consisting alternately of 60 lbs. nitrogen per acre, and a mixture containing 60 lbs. nitrogen, 20 lbs. phosphoric acid and 12½ lbs. potash.

Potash stocks are now rationed for Rubber more than 7 years old. The maximum amount that will be supplied is 50 per cent of that normally given or 20 lbs. Muriate of Potash (=10 lbs. K_2O) per acre, whichever is the greater.

As a substitute for Sulphate of Ammonia or Calcium Cyanamide, Nitrate of Soda may be used. 375 lbs. of this fertiliser contain 60 lbs. nitrogen.

The remarks made under the heading immature Rubber on the possible loss of nitrogen by leaching apply here also.

As a safeguard the manure may be given in two half quantity applications, each broadcast over the whole area.

An organic manure such as Groundnut Cake may be included in place of some of the Nitrate of Soda, but if the amount of the Groundnut Cake exceeds say 150 lbs. per acre the mixture should be forked into the soil.

Relative Importance of Rubber of Different Ages and Condition with Respect to Manuring

Where, owing to shortage of supplies or to the desire to economise in expenditure, it is necessary to curtail part of a manuring programme, the relative importance of different stands of Rubber may have to be considered.

The following general scheme is put forward. The classes are in order of decreasing importance.

(1) Young Rubber on Replanted Clearings.

The early years of the young plant are most important with respect to plant food sufficiency, and the soil of replanted areas is generally poor in plant food.

Although the response to the manuring of young plants on experimental areas under the supervision of the R.R.S. has so far been disappointing, we regard it as highly desirable, on the grounds mentioned in the previous paragraph, to continue manuring in order to safeguard against any check to growth.

(2) Young Rubber on Newly Cleared Jungle.

There is likely to be sufficient nitrogen and possibly other plant foods in the soil to satisfy the young plant, but there is evidence of occasional response to manuring of young plants on jungle soil. An important factor is the care that has been taken, after clearing, to prevent the loss of the nutrient-bearing top soil.

A decision on the need for manuring may be made from the appearance and depth of the soil, and later from the growth of the plants.

(3) Mature Rubber in Poor Condition.

Where a manuring programme has already been started in order to combat falling yield or poor foliage or bark it is desirable that such a programme should not be interrupted.

(4) Mature Rubber in Satisfactory Condition.

Cessation of manuring for a year or two would not be expected to have any permanent harmful effect on the Rubber.

PACKING RAW RUBBER

M. W. PHILPOTT, *Chemist*

THE packing of raw rubber has been a subject for discussion and experiment since the earliest days of the plantation rubber industry. The purpose of this note is to give a short account of the methods now in use and to try to indicate probable future developments.

The war has made it necessary to take stock of packing methods because of the present shortage of plywood for rubber chests. In June, 1940, the Secretary of State for the Colonies wrote to the Rubber Growers' Association and the Rubber Trade Association in London stressing the urgent need under present conditions for strict economy in the expenditure of dollar exchange on packing materials, and urging that rubber producers should substitute as rapidly as possible burlap or jute gunnies in place of plywood for the packing of rubber. The Secretary of State went on to say that it was essential that no delay in shipping rubber to the United Kingdom and United States of America should be occasioned by the shortage of plywood chests for packing.

Prior to the issue of this request many producers and shippers had already foreseen difficulties in the continued use of plywood chests under war-time conditions owing to the rapidly increasing cost of plywood. The cessation of Scandinavian supplies, the higher cost of freight and the adverse exchange situation had all contributed to raise the price to an almost prohibitive level. The local price of an imported rubber chest is now about Rs. 4.50 which is about double the pre-war price and represents a cost for the packing case alone of about 2 rupee cents per lb. of rubber packed.

Another factor to be considered is that wooden cases occupy more shipping space per ton of rubber than bales. Now that the efficient use of ships is a matter of national importance this factor needs no emphasis.

Apart from restrictions that may be imposed by war-time conditions, however, other factors, both technical and economic, have for some time past been tending to reduce the volume of rubber which is shipped in wooden cases.

The type of package generally adopted from the early days of the plantation industry was the wooden chest. Chests were easily opened for sampling at the wharfs, and as long as they remained undamaged in transit, they offered moderately good protection to the rubber against dust and dirt. For these reasons the wooden chest remained, until a few years ago, the most popular form of package for higher grades in all the markets of the world, particularly in the European market. Indeed, until March, 1940, when the R. T. A. specifications were amended to include burlap bales,* the Rubber Trade Association of London did not formally recognise any package for standard contracts other than the wooden case.

One serious disadvantage of the wooden case from the consumer's point of view is the ease with which it is damaged in shipment. One manufacturer complains that at least half the cases of an average consignment arrive in a broken condition. Splinters and nails from the damaged cases penetrate into the mass of rubber and often cause serious difficulties in subsequent processing operations.

Some years ago this objection led certain American manufacturers to insist that their rubber should be shipped from the East in bales. Trials were made with bales of various designs, and two types, the hessian covered bale and the "bare-back" bale, eventually became well established in America. So successful were these types of packing that during the last few years the popularity of baled rubber has extended, despite the provisions of the Rubber Trade Association Packing Specifications, to the European markets.

The present position, then, is that the bale, on its own merits, has already achieved popularity as a method of packing rubber, quite apart from its particular suitability under war-time conditions. Properly constructed bales have for long been permitted by the standard contracts of the Rubber Manufacturers' Association of New York, and the hessian bale is now also formally recognised

* The Revised Packing Specifications of the Rubber Trade Association insofar as they refer to No. 1 R.S.S. and No. 1 Thick Latex Crepe, are quoted at the end of this memorandum.

by the Rubber Trade Association of London as a suitable alternative to the plywood chest. In view of the necessity, in the present emergency, of economising foreign exchange, there appears to be no reason why the industry should not entirely discontinue the use of plywood and other wooden cases, except, possibly, for packing sole crepe and other special grades. Enquiries which were made in Colombo at the time of the Secretary of State's appeal, revealed that the greater part of Ceylon's produce was then already being exported in sized hessian (or gunny) covered bales, while an appreciable amount of smoked sheet was also going forward to U. S. A. packed in "bare-back" bales. The proportion shipped in wooden chests cannot be accurately stated, but it was already small and was diminishing. Of this relatively small volume of cased rubber, the major part, it is believed, was packed for shipment before leaving the estate.

A few notes on the construction of rubber bales may be of interest to those estate managers who have already been asked to pack in bales instead of chests.

The Hessian Covered Bale

A very common material for wrapping bales is jute hessian (burlap) or gunny sacking. The bales are usually built up as follows: A pile of smoked sheets together with side and end wrapping sheets of the same quality rubber is placed in position in a baling press. The wrapper sheets are so arranged that in the finished bale they completely envelope the piled sheets. The wrappers are heavily dusted on both sides with talc (French chalk) to prevent sticking. The pile is then compressed and secured by means of two galvanised iron or steel bands. After removing the strapped pile of rubber from the press the loose edges of the wrapper sheets are stretched over the ends and corners of the bale and fixed in position by "pricking" with a pronged hammer. The rubber is then ready to be sewn into its hessian jacket. The completed ball usually occupies 5 cubic feet.

In the baling of Thick Pale Crepe (Ceylon Blanket) the same procedure is followed except in regard to the wrapper sheets. Thick crepe cannot easily be stretched over the pile of rubber to form a dust excluding envelope, but some measure of protection can be provided by strapping pieces of equal quality crepe at the sides and ends of the bales. Some packers aim at giving additional

protection by stretching one or two layers of lace crepe over the otherwise unprotected corners of the bale.

In the early days of hessian bales, rubber was frequently found, on reaching its destination, to be contaminated with jute fibres. This presented the consumer with a new and serious problem, namely, that of freeing the rubber from fibres, which, if allowed to remain in the rubber, would have a detrimental effect on the quality of certain classes of goods such as inner tubes. The difficulty was overcome to a great extent by the use of well talced wrapper sheets as already described, and by sizing the hessian cover in order to hold down the fibres and reduce the tendency for them to break off and enter the interior of the bale.

The sizing of the hessian or gunny is important. An application for this purpose which is both cheap and effective is :—

Tapioca flour	...	120 lbs.
Silicate of Soda (water glass)		7½ lbs.
Water ...	...	120 gallons.

The hessian or gunny is liberally coated with this paste to ensure adequate fibre anchorage and is then thoroughly dried in the sun. Other starchy pastes or glues may be found to be equally suitable, but it is necessary to make sure that they do not contain any ingredient which might be injurious to the rubber. This point must be emphasized because at least one firm of local shippers have been using a tapioca size to which copper sulphate is added as an insecticide. This practice is to be strongly deprecated in view of the well known deleterious effect of traces of copper compounds in rubber. Insect attack is unlikely to occur if the size is made up with a binding material such as silicate of soda.

The "Bare-Back" Bale

Much attention has been given during the last two or three years to the method of packing in naked bales. This method was first developed by one or two large American consumers who shipped rubber direct to their own factories, but the practice appears to be growing in popularity among smaller users, and it is understood that rubber in "bare-back" bales is now being offered for sale on the New York market.

For a full description of the method, the reader is referred to a paper by D. E. Andrews which was published in *The India Rubber World,* Vol. 101, March, 1940, and later summarised in the Rubber Research Institute Planters' Bulletin No. 12, July, 1940. Briefly, the recommended procedure is to assemble the sheets on a platform weighing machine to the standard weight of 250 lbs. including the wrapper. A steel plate on the top of the pile is forced down in a baling press and is then locked in position with clamps. The rubber can then be removed from the press and left under pressure between the clamped plates. After 30 minutes or longer the pressure is released and the ends of the wrapper sheets are fixed in position by application of a rubber adhesive or by pricking, and finally the bale is stencilled and thoroughly treated with a suspension of talc. No iron bands are used for binding the sheets.

One favourable feature of the rubber-wrapped bale is obvious. It costs the producer nothing for covering materials or strapping. Added to this is the advantage, claimed by the consumers, that the rubber is received in a cleaner condition than rubber packed in hessian or gunny covered bales. The wrapper sheets, of course, pick up much dirt in transit, but the interior of the bale is stated to be well protected. One large American manufacturer has said that "it is our opinion that this rubber-wrapped bale is the best commercially practicable package for smoked sheet rubber which has been devised to date."

Colombo shippers might be well advised to give serious attention to this method of packing. The hessian covered bale is not entirely satisfactory and the plywood chest is obsolescent. It seems quite possible that within a few years most of the world's sheet rubber will be shipped in rubber-wrapped bales.

APPENDIX

Rubber Trade Association Packing Specifications (Revised: 1940).

Ribbed Smoked Sheets

Ribbed Smoked Sheets may be packed in burlap bales or wooden cases per contract designation.

If packed in cases, the number of cases to the ton shall be 9 or 10 (at Seller's option) unless otherwise stated on the contract. The rubber must be completely wrapped on all sides with equal quality rubber.

If packed in bales, the minimum number of bales to the ton shall be 9.

Before covering with burlap the rubber must be completely wrapped on all sides with equal quality rubber. The inside of the wrapper sheet shall be dusted with talc to prevent sticking, and the outside of the wrapper sheet shall be dusted with talc to prevent adhesion of the burlap, but not more than ¾ pound of talc per package shall be used, including dusting between sections when rubber is so packed.

Before covering with burlap, the Ribbed Smoked Sheets may be strapped by using iron bands on outside of wrapper sheets of a minimum width of ⅝ in. These bands should preferably be galvanised. Wires must not be used.

Nothing inferior to new 11 or 12 oz. Hessians shall be used for coverings. Second-hand rice or sugar bags, without holes or patches are satisfactory. All burlaps must first be liberally coated with a proper mixture of sago flour, water and silicate of soda to prevent the covering from adhering to the rubber. A generous application of this solution must be given to insure proper absorption. The burlap should be thoroughly dried before applying it to the rubber.

No. IX.—Superior Quality Thick Pale Latex Crepe.

No. I. Standard Quality Thick Pale Latex Crepe.

The above may be packed in burlap bales or wooden cases per contract designation.

If packed in cases, the minimum number of cases to the ton shall be 12.

If packed in bales, the minimum number of bales to the ton shall be 10.

Before covering with burlap, the rubber may be strapped by using iron bands of a minimum width of ⅝ in. These bands should preferably be galvanised. Wires must not be used.

Nothing inferior to new 11 or 12 oz. Hessians shall be used for covering. Second-hand rice or sugar bags, without holes or patches, are also satisfactory. All burlap, must first be liberally coated with a proper mixture of sago flour, water and silicate of soda to prevent the covering from adhering to the rubber. A generous application of this solution must be given to insure proper absorption. The burlap should be thoroughly dried before applying it to the rubber.

PLANTING NOTES

PAINTS FOR COAGULATING EQUIPMENT

IN normal times latex utensils and coagulating equipment are usually constructed of materials, notably aluminium, which are not attacked by dilute acetic or formic acid or by the natural acidity of field latex. Now that aluminium supplies are being curtailed it is necessary to consider how iron, teak and other substitute materials may best be protected against the action of dilute acids The question is frequently asked whether acid-resisting paints are available for this purpose, and it may therefore be useful to place on record the conclusions which we have been able to draw from our observations on the performance of a large number of experimental and proprietary paints that have been tried under estate conditions at Dartonfield.

A protective coating for latex equipment should be resistant to the chemical conditions of service, and hard enough to withstand rough handling and frequent cleaning. Ordinary oil paints are destroyed by dilute acids in a relatively short time. In our experience the best protection for both wood and metal is given by suitably formulated chlorinated rubber paints of which there are now a fair number on the market. These paints are quick drying, hard, and highly resistant to chemical attack. They are, however, relatively expensive and at present are stocked only in small quantities in Ceylon.

Bituminous paints, though not equal to the chlorinated rubber base paints in lasting properties, provide a practical alternative. Such paints are cheap and resistant to dilute acids. They possess the disadvantage of being rather soft, though they harden up in time. Bituminous paints should be applied to the equipment, if possible, some weeks before use in order to allow the coating time

to harden. They require to be more frequently renewed than chlor-rubber paints, but as they are very cheap this is not an important disadvantage.

Bituminous and chlor-rubber paints can be applied to wood or metal. Wooden coagulating troughs and tanks should be painted while still new because paint does not adhere well to timber which is already impregnated with serum substances. Two coats are generally sufficient for the initial application.

It is hardly necessary to enumerate the many directions in which protective paints can be used with advantage in the rubber factory. An occasional internal application of acid-resisting paint is an effective way of minimising corrosion in iron transport tanks, settling tank pipe fittings, latex buckets, and galvanised iron measures. Wooden coagulating tanks and troughs are often used without any protective coating, or with a coating of wax, but the application of a suitable paint is probably the simplest method of keeping wooden equipment clean and free from accumulated serum substances which might ferment and cause bubbles in the sheet. Coagulating tank separators made of iron, teak, "pressed wood" or other substitute for aluminium sheet, can also be effectively preserved with an acid-resisting paint.

The proprietary names of suitable bituminous and chlor-rubber paints which are now available in Ceylon can be given on request.

M. W. P.

R.R.I. TUNNEL TYPE SMOKEHOUSE

The attention of visiting agents and estate managers who may be contemplating the installation of new smokehouses is drawn to the Tunnel Type Smokehouse which was designed two or three years ago by the Rubber Research Institute of Malaya. Based as it is on sound scientific principles it is probably the best type now available for estates with a daily production of over 800 lbs. of rubber. The main features of the design are :—

(1) There is no carrying of sheet ; trolleys convey the rubber from the rolling shed through the smokehouse and back to the packing room.

(2) Smoking is continuous, and sheets of normal thickness are dried in 4 days.

(3) All the air entering the building is preheated by passing round the outside of the furnace shell, an arrangement which tends also to ensure efficient curing by the production of an adequate quantity of smoke.

(4) The initial cost is not high.

A full description of the Tunnel Type Smokehouses will be found in the *Journal of the Rubber Research Institute of Malaya,* 1938, Vol. 8, page 258. One smokehouse has already been installed at an estate in the Kalutara district and several more, it is understood, are to be erected during 1941.

Further information and advice can be had on application to the Research Scheme.

M. W. P.

DOUBLE-THREE TAPPING (2/S2, d/3, 133/%)

The announcement of 100 per cent release for the first quarter of 1941, and the expectation that the quota will be maintained at a high figure for the whole year, has created something of a problem for those estates which have large areas out of production on account of recent replanting programmes. The sale of surplus export rights is likely to be a much less lucrative transaction than the sale of rubber itself, and the problem before many estates will be how to harvest their standard assessment from, perhaps, 80 per cent or 90 per cent of the total planted acreage. The purpose of this note is to draw attention to a system of tapping by which this may be done (at least under certain conditions) without causing any permanent injury to the trees.

When the system usually known as Double-Three, that is, 2S/2, d/3, 133%, was included in the series of treatments under trial in a tapping experiment on Dartonfield the object was to obtain information on a method that might usefully be employed for obtaining extra crop in an area due to be replanted after, say, two or three years. The system was thought to be too drastic for use in any other circumstances unless periodic rests were introduced and the intensity thus reduced to 100 per cent or less. Somewhat surprisingly, however, the yield and dry rubber content of the latex from the plots tapped by this method have been maintained at satisfactory levels for a period of nearly four years.

The reader's attention is drawn to a paper describing the results of this experiment for the first three years, which is published in the *Third Quarterly Circular* for 1940 (Vol. 17, Part 3, p. 191). The following information, comparing Double-Three tapping with the half spiral alternate day system (S/2, d/2, 100%), summarises the salient points :—

Yield.—For the period of three years the 2S/2, d/3, 133% plots have given 15 per cent more crop than the S/2, d/2, 100% plots. This compares with an extra intensity of 33 per cent, and it is therefore clear that the yield per cut per tapping is lower with the more intense system. Up to the end of the third year, however, there is no evidence of a relative decrease with time.

Dry Rubber Content.—The most significant figures are those obtained from careful d.r.c. determinations made in November and December, 1940, *i.e.*, after the system had been employed for 3¾ years.

2S/2, d/3, 133%	...	38.9%	(12 days)
S/2, d/2, 100%	...	38.2%	(18 days)

Throughout the experiment there has been no indication of a decrease in dry rubber content of the latex such as invariably accompanies an unduly drastic method of tapping.

Bark Renewal.—The figures for thickness of 37 months old renewed bark for the two systems are :—

2S/2, d/3, 133%	...	7.3 mm.
S/2, d/2, 100%	...	6.7 mm.

The difference is not statistically significant, but it is evident that under the conditions of the experiment the more intense tapping has had no adverse effect on bark renewal.

Bark Consumption.—

2S/2, d/3, 133% 4¼ inches on each side = 8 in. per annum.

S/2, d/2, 100% 5½ inches per annum.

The consumption of 8 inches per annum might be too high for permanent adoption, but as a temporary expedient for, say, one year the extra consumption is immaterial.

Brown Bast.—The percentages of trees with Brown Bast after three years' tapping were :—

2S/2, d/3, 133%	...	6.7%
S/2, d/2, 100%	...	2.2%

It seems clear that an increased incidence of Brown Bast is to be expected though this, again, is unlikely to be important if the system is adopted for only one year.

Labour.—If the number of trees in a tapper's task were to bear the ratio 2S/2, d/3 : S2, d/2=2 : 3, the number of tappers required would be exactly the same as that under alternate day tapping. Actually it is usually reckoned that for optimum results the ratio should be about 5 : 8, in which case 7 per cent more tappers are required.

Cost of Tapping.—On the supposition that the yield per acre is increased by 15 per cent, the cost of tapping will be reduced by about 7 per cent.

The results of this experiment must be qualified by stating that the conditions on Dartonfield Estate are relatively favourable for the adoption of a tapping system of more than 100 per cent intensity. In the first place the trees are in a good general condition and have ample bark reserves. The level of yield is about 550 lb. per acre and regular biennial manuring has been carried out since 1936.

Secondly, the annual rainfall is high (average 170 ins.) and owing to frequent interference by rain the average number of tapping days is only about 300 per annum (of which about 25 are wash-outs). In such circumstances it is a usual, and in our opinion a reasonable, estate practice to make up crop by double tapping for a few days after a wet spell. In the experimental areas, however, double tapping has never been employed, so the intensity of the Double-Three system is really rather less than 33 per cent in excess of normal alternate day estate procedure. No attempt should be made to double tap on this system unless the area is due to be replanted in the near future.

It is uncertain whether similarly favourable results would be obtained in areas which are in a poorer general agricultural condition, and the system is likely to prove too drastic for the drier

districts where even S/2, d/2, 100% is usually regarded as too severe for permanent adoption. On estates whose conditions approximate to those of Dartonfield, however, the Double-Three system (2S/2, d/3, 133%) can be commended as a *temporary expedient* to avoid financial loss as the result of inability to harvest their standard assessment. It should be recognised that an increase in the intensity of tapping in one year may need to be counterbalanced by a decrease below the normal 100 per cent during some future period when prices are less favourable.

R. K. S. M.

MEETINGS

RUBBER RESEARCH SCHEME (CEYLON)

Minutes of the fifty-third meeting of the Rubber Research Board held in the Ceylon Chamber of Commerce Building, Colombo, at 2-30 p.m. on Monday, 2nd September, 1940.

Present: Mr. E. Rodrigo, C.C.S. (in the chair), Mr. C. H. Collins, C.C.S., (Acting Financial Secretary), Mr. T. Amarasuriya, Mr. W. P. H. Dias, J.P., Mr. L. M. M. Dias, Mr G. E. de Silva, M.S.C., Mr. T. C. A. de Soysa, Mr. J. D. Farquharson, Mr. L. P. Gapp, Mr. F. H. Griffith, M.S.C., Mr. R. J. Hartley, Mr. R. C. Kannangara, M.S.C., Mr. J. C. Kelly, Mr. F. A. Obeyesekera, Mr. N. D. S. Silva, O.B.E., J.P., Mr. E. C. Villiers, M.S.C., and Mr. E. W. Whitelaw.

Mr. R. K. S. Murray, Acting Director, was present by invitation.

1. Minutes.

Draft minutes of the meeting held on 10th June, 1940, which had been circulated to members, were confirmed and signed by the Chairman, subject to the amendment that the words "the Deputy Financial Secretary" in item 1(b)2 be replaced by "the Financial Secretary or a person deputed by him."

2. Board.

(a) Renomination of Mr. G. E. de Silva.—The Chairman reported that Mr. G. E. de Silva had been renominated as a representative of the State Council to serve on the Board for a further period of three years from 13th July, 1940.

(b) Nomination of Mr. J. D. Farquharson.—The Chairman welcomed Mr. J. D. Farquharson who had been nominated by the Planters' Association of Ceylon in place of Mr. B. M. Selwyn with effect from 25th June, 1940.

(c) Nomination to Experimental Committee.—The Chairman said it was necessary to make a nomination to the Experimental Committee in order to fill the vacancy created by the retirement of Mr. B. M. Selwyn. Mr. G. E. de Silva proposed and Mr. Whitelaw seconded that Mr. R. C. Kannangara be appointed. Carried unanimously.

3. Provident Fund.

(a) Minutes of Meeting of Board of Trustees.—The minutes of the first meeting of the Board of Trustees were adopted, and the recommendation that the portion of the Fund representing contributions and interest up to 31st March, 1940, should continue to be invested with the Board and bear interest at 4½ per cent per annum was approved.

(b) Draft Revision of Rules.—The draft rules prepared by the Acting Director were approved subject to a number of minor amendments, and it was agreed that they should be referred to the lawyers and the final draft circulated to the Board for approval.

4. Smallholdings Committee.

Recommendations made at a meeting held on 9th August, 1940, were considered.

(a) Marketing Facilities for Village Rubber.—It was agreed that the attention of the Commissioner for Development of Agricultural Marketing be drawn to the fact that the market conditions were now suitable for a scheme of "approved dealers" in villages for the sale of smallholders' rubber to be effective.

(b) Ruanwella Range.—The recommendation was approved that this range be divided into two and an additional Instructor appointed in 1941.

(c) Sale of Planting Material.—It was agreed that the following scale of charges should be adopted as from 1st January, 1941 :—

	Budded Stumps	Budwood (per yd.)
Owners of less than 5 acres ...	15 cts.	25 cents.
„ „ 5—30 acres ...	25 „	50 „

(d) Mileage Allowance.—The recommendation of the Committee was that an increased payment of -/05 cents per mile over the existing mileage rates be made to the Smallholdings Propaganda Officer as

he was frequently called upon to travel on very bad roads and thereby had to incur heavy repair bills for his car. After discussion the recommendation was approved.

5 Experimental Committee.

Recommendations made at a meeting held on 17th July, 1940, were considered.

(a) Shipments of Latex to India.—The Chairman stated that the Committee had considered the question of continuing the manufacture of preserved latex at Dartonfield and recommended that the attention of the Board be directed to the increased demand for Ceylon latex from India. In the meantime information had been received from the Ceylon Trade Commissioner at Bombay urging that early steps should be taken to encourage the local production of latex if a market were to be developed. A letter had, therefore, been addressed to the Ceylon Estates Proprietary Association, the Low-Country Products Association of Ceylon and the Planters' Association of Ceylon drawing their attention to the possibility of developing a trade in rubber latex between Ceylon and India. This action was approved and it was agreed that the Scheme should do everything possible to encourage the production of latex and that its preparation should be continued at Dartonfield for the present.

(b) Application for Land for Clone Museum.—The Chairman reported that suitable land was not available from Government for the establishment of a clone museum for studying resistance to Oidium, and the Experimental Committee had therefore recommended that the Agents of estates in the Matale district which had promised their co-operation in the search for resistant clones be approached to ascertain whether and under what conditions they would lease about 25 acres of land for the establishment of a clone museum. This was approved.

(c) Coconut Poonac as Manure.—Correspondence with the Director of Research, Coconut Research Scheme, and the Acting Director of Commerce and Industries regarding the use of poonac as a manure on Rubber estates was tabled.

6. Accounts.

(a) Statement of Receipts and Payments of the Board for the quarter ended 30th June, 1940, was adopted.

(b) Dartonfield and Nivitigalakele accounts for March, April and May, 1940, were tabled.

(c) Investment in Ceylon Government 3¼% Loan 1949-51.—The Chairman reported that, as decided at the last meeting, Rs. 30,000 had been invested in Ceylon Government 3¼ per cent Loan 1949-51 at Rs. 101.

7. Staff.

(a) Appointment of Estate Superintendent.—The Chairman reported that the post of Estate Superintendent had been rendered vacant by the resignation of Mr. D. L. Nicol. Applications had been invited by advertisement and considered by the Experimental Committee. After a full discussion the Committee's recommendation that Mr. G. P. N. de Silva be appointed at an initial salary of Rs. 250 per mensem was approved.

(b) Nomination of Director to serve on the Soil Conservation Committee of the Central Board of Agriculture. This was approved.

(c) Release of Staff for War Service.—In continuation of the conditions decided upon at the meeting held on 10th June, 1940, the following decisions were reached :—

(1). An officer who is released for war service should give an undertaking that he will return to the service of the Board on demobilisation unless physically incapacitated.

(2). The contribution of the Board and of the officer to the Provident Fund should be calculated on the officer's full salary on the date of leaving Ceylon, the military salary being regarded as a refund to the Board.

8. Conference of Directors of Rubber Research Organisations in the East.

(a) Recommendations.—The recommendations were considered and approved in principle with the reservation that under present conditions it might not be possible to implement them fully. With regard to Recommendation No. 8 concerning patents, the Board decided to adopt the same policy as the Rubber Research Institute of Malaya, namely that any results of work of the Scheme, which are capable of patent protection and considered worthy of such protection, shall be patented, and the rights in such patents shall be wholly vested in the Board.

(b) Mr. O'Brien's Diary Notes.—These notes, which had been circulated to members for their confidential information, were approved.

The Chairman drew attention to the recommendation that about 500 acres of land should be acquired for extension of selection and breeding work. He suggested that the Acting Director be asked to formulate proposals and submit them to the Board. —Agreed.

9. *Acting Director's report for the quarter ended 30th June, 1940,* was adopted.

10. London Advisory Committee.

Minutes of meetings of the Committee and the Technical Sub-Committee held on 24th May, 1940, were adopted.

Research Laboratories,
Dartonfield, Agalawatta,
7th October, 1940.

RUBBER RESEARCH SCHEME (CEYLON)

Minutes of the fifty-fourth meeting of the Rubber Research Board held in the Ceylon Chamber of Commerce Building, Colombo, at 2-30 p.m. on Monday, 28th October, 1940.

Present : Mr. M. Park, Acting Director of Agriculture (in the chair), Mr. C. H. Collins, C.C.S., (Acting Financial Secretary), Mr. T. Amarasuriya, Mr. W. P. H. Dias, J.P., Mr. L. M. M. Dias, Mr. T. C. A. de Soysa, Mr. J. D. Farquharson, Mr. L. P. Gapp, Mr. R. J. Hartley, Mr. J. C. Kelly, Mr. F. A. Obeyesekera and Mr. N. D. S. Silva, O.B.E., J.P.

Mr. R. K. S. Murray, Acting Director, was present by invitation, and Mr. M. W. Philpott, Chemist, was present during the consideration of research programmes for 1941.

Apologies for absence were received from Mr. G. E. de Silva, M.S.C., Mr. F. H. Griffith, M.S.C., Mr. R. C. Kannangara, M.S.C., and Mr. E. W. Whitelaw.

1. Minutes.

(a) Draft minutes of the meeting held on 2nd September, 1940, which had been circulated to members, were confirmed and signed by the Chairman.

(b) Matters arising from the minutes —

(1) *Marketing Facilities for Village Rubber.*—The Chairman reported that the Commissioner for Development of Agricultural Marketing had been approached in regard to the possibility of appointing "approved dealers" in villages for the sale of smallholders' rubber, and a reply had been received to the effect that the matter would be considered in November when the availability of the necessary staff was known.

2. Board.

The Chairman reported that as Acting Director of Agriculture he had assumed duties as Acting Chairman of the Board with effect from 14th October, 1940.

3. Staff.

(a) Mr. T. E. H. O'Brien.—Reported the signature of Mr. T. E. H. O'Brien's new service agreement.

(b) Estate Superintendent.—Reported that Mr. G. P. N. de Silva had assumed duties as Estate Superintendent on 18th September, 1940.

(c) Officers on Military Training.—Reported that under the present regulations for compulsory training for members of the C.P.R.C. three officers, Mr. Philpott, Dr. Whelan and Dr. Ford, were absent from duty for at least four full working days per month, and that this would inevitably curtail the work of the departments concerned. It was agreed that full facilities for such training should be allowed, but that if these officers were asked to attend courses of six weeks' duration, subject to the employers' permission, the Director should have discretion in each individual case regarding their release.

(d) Junior Staff.—Reported the resignation of Mr. V. K. Viswanathan, Laboratory Assistant.

4. Experimental Committee.

Recommendations made at meeting held on 8th October, 1940 :—

(a) Supplementary Votes.—The following supplementary votes were passed as recommended by the Committee :—

1. Factory Upkeep ... Rs. 275.00
2. Water and Power Scheme (Capital) Rs. 556.32

(b) Research Programmes for 1941.—The draft research programmes for 1941 were considered, and the Committee's minute that there was a possibility of work having to be curtailed in certain directions owing to the periodical absence of officers on military duty was noted. The Acting Director said that every effort would be made to continue important experiments which were already in progress or for which provision had been made in the shape of planting material, etc.

The programmes were adopted subject to observations by members and explanations given by the Acting Director and Chemist.

5. Accounts.

(a) Dartonfield and Nivitigalakele accounts for June and July, 1940, were tabled.

(b) Estimates of Income and Expenditure for 1941—Estimates of income and expenditure were considered and adopted subject to alterations due to the recent revision of the Minimum Wage. The following is a summary of the estimates :—

Income		Rs. 244,994
Expenditure : Revenue Account	Rs. 219,310	
Capital Account	,, 9,388	,, 228,698
Surplus of income over expenditure ...		Rs. 16,296

6. Clone Museum.

Approval was given to detailed proposals for the establishment of a clone museum on an estate in the Matale District for the study of the reaction of a large number of clones to attacks by Oidium leaf disease. It was noted that the proposals had been submitted to the Directors of the Company in London.

7. Industrial Advisory Committee.

Correspondence with the Acting Director of Commerce and Industries regarding the proposed formation of an Industrial Advisory Committee was tabled. It was decided to circulate the correspondence to members, together with the Report of the Research Facilities Committee (Sessional Paper No. XIII of 1935).

8. Publications.

The Annual Report for 1939 and the *Second Quarterly Circular* for 1940, were tabled.

Mr. Farquharson suggested that an article on War-time Manuring, embodying the information contained in R.R.I. Planters' Bulletin No. 13, be included in the next issue of the *Quarterly Circular*. The Acting Director said that a memorandum on manuring under present conditions of restricted supplies had recently been prepared and sent to the Ceylon Estates Proprietary Association, the Low-Country Products Association and the Planters' Association of Ceylon. He understood that it had been circulated to the members of these Associations.

The meeting terminated with a vote of thanks to the Chamber of Commerce for the use of the Committee Room.

Research Laboratories,
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12th November, 1940.

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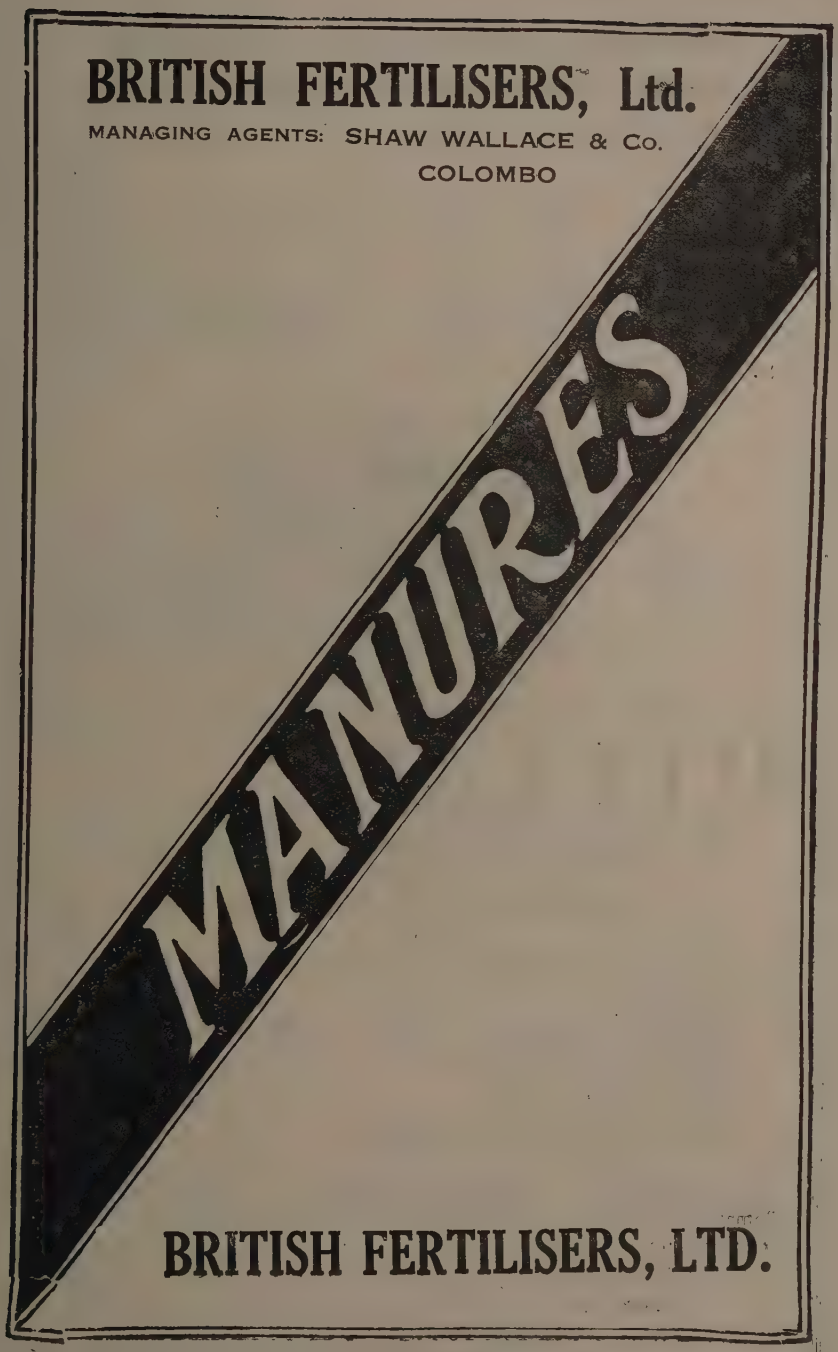
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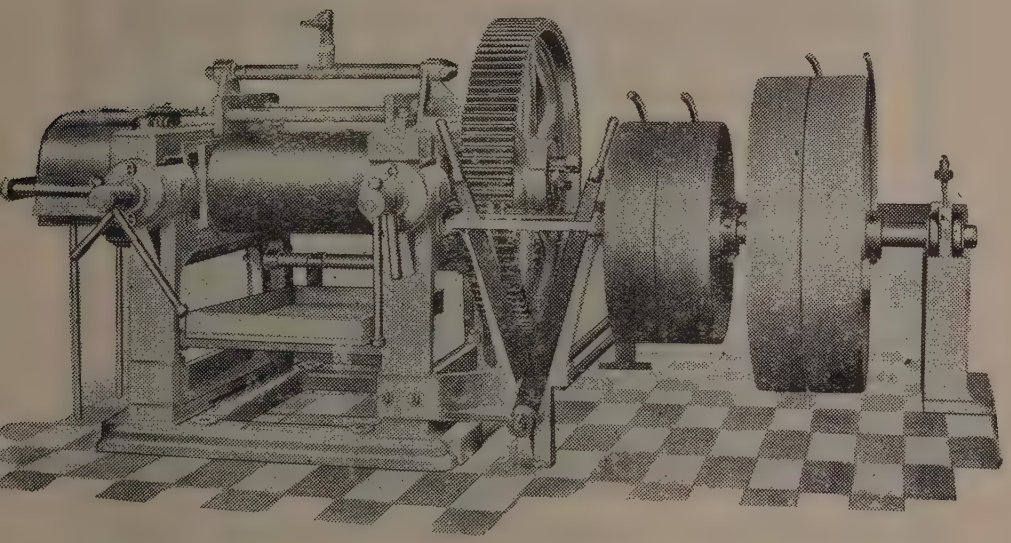

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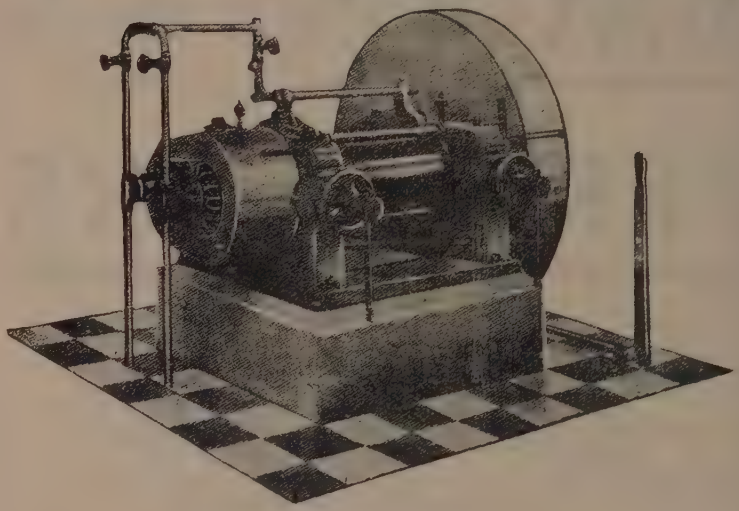

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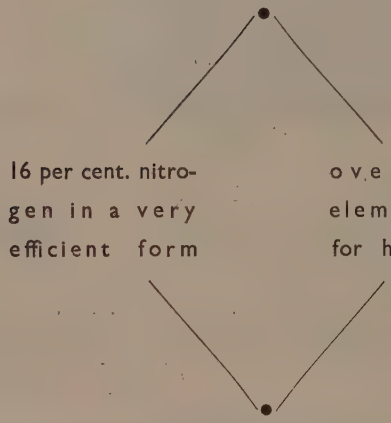

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Mr. G. G. Balazs.
Mr. B. D. Porritt.
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